

## IN THE CLAIMS

Please amend the claims as follows:

1. (Original)        A system comprising:
  - a memory;
  - a plurality of pages held in the memory;
  - an instruction translation look aside buffer (ITLB);
  - a first data translation look aside buffer (DTLB);
  - a translation look aside (TLB) miss handler; and
  - an executable/non-executable (x) indicator associated with each page in memory wherein the TLB miss handler sets the x-indicator for a particular page to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the ITLB refuses to allow instructions from a page with an associated x-indicator of “non-executable” to be loaded.
2. (Original)        The system of claim 1, wherein the TLB miss handler is implemented at least in part as software.
3. (Currently amended)        ~~The system of claim 1,~~  
   A system comprising:
  - a memory;
  - a plurality of pages held in the memory;
  - an instruction translation look aside buffer (ITLB);
  - a first data translation look aside buffer (DTLB);
  - a translation look aside (TLB) miss handler; and
  - an executable/non-executable (x) indicator associated with each page in memory wherein the TLB miss handler sets the x-indicator for a particular page to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the ITLB refuses to allow instructions from a page with an associated x-indicator of “non-executable” to be loaded,wherein the DTLB is utilized only for vector accesses to memory.

4. (Currently amended) ~~The system of claim 1,~~

A system comprising:

a memory;

a plurality of pages held in the memory;

an instruction translation look aside buffer (ITLB);

a first data translation look aside buffer (DTLB);

a translation look aside (TLB) miss handler; and

an executable/non-executable (x) indicator associated with each page in memory wherein the TLB miss handler sets the x-indicator for a particular page to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the ITLB refuses to allow instructions from a page with an associated x-indicator of “non-executable” to be loaded,  
wherein the DTLB is utilized only for scalar accesses to memory.

5. (Previously presented) A system comprising:

a memory;

a plurality of pages held in the memory;

an instruction translation look aside buffer (ITLB);

a first data translation look aside buffer (DTLB);

a translation look aside (TLB) miss handler; and

an executable/non-executable (x) indicator associated with each page in memory wherein the TLB miss handler sets the x-indicator for a particular page to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the ITLB refuses to allow instructions from a page with an associated x-indicator of “non-executable” to be loaded,  
further comprising for each page in memory:

a read bit indicating that the page is valid and readable; and

a write bit indicating that the page is valid and writable.

6. (Original) The system of claim 1, further comprising a write bit associated with each page in memory that indicates the respective page is writable.

7. (Original)        The system of claim 1, further comprising a page table used to translate a virtual address to a real address, wherein the x-indicator for each page is held in the page table entry associated with that page.

8. (Original)        The system of claim 7, wherein the page table used to translate a virtual address to a real address includes a write bit in each page table entry.

9. (Previously presented)    A system comprising:

- a memory;
- a plurality of pages held in the memory;
- an instruction translation look aside buffer (ITLB);
- a first data translation look aside buffer (DTLB);
- a translation look aside (TLB) miss handler;

an executable/non-executable (x) indicator associated with each page in memory wherein the TLB miss handler sets the x-indicator for a particular page to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the ITLB refuses to allow instructions from a page with an associated x-indicator of “non-executable” to be loaded; and

a page table used to translate a virtual address to a real address, wherein the x-indicator for each page is held in the page table entry associated with that page, wherein the page table used to translate a virtual address to a real address includes:

- a write bit in each page table entry; and
- a read bit in each page table entry.

10. (Original)        A system comprising:

- a memory;
- a plurality of pages held in the memory;
- an instruction translation look aside buffer (ITLB);
- an ITLB miss handler associated with the ITLB;

a data translation look aside buffer (DTLB);  
a DTLB miss handler associated with the DTLB; and  
an executable/non-executable x-indicator associated with each page in memory wherein the DTLB miss handler sets the x-indicator for a particular page to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the ITLB refuses to load instructions from a page if the x-indicator indicates a “non-executable” state.

11. (Original) The system of claim 10, wherein the ITLB miss handler sets the x-indicator to an “executable” state when a page is valid and executable.

12. (Original) The system of claim 10, wherein the ITLB miss handler is implemented at least in part as software.

13. (Original) The system of claim 10, wherein the DTLB miss handler is implemented at least in part as software.

14. (Currently amended) ~~The system of claim 10,~~

A system comprising:

a memory;  
a plurality of pages held in the memory;  
an instruction translation look aside buffer (ITLB);  
an ITLB miss handler associated with the ITLB;  
a data translation look aside buffer (DTLB);  
a DTLB miss handler associated with the DTLB; and  
an executable/non-executable x-indicator associated with each page in memory wherein the DTLB miss handler sets the x-indicator for a particular page to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the ITLB refuses to load instructions from a page if the x-indicator indicates a “non-executable” state,  
wherein the DTLB is utilized only for scalar accesses to memory.

15. (Currently amended) ~~The system of claim 10,~~

A system comprising:

a memory;

a plurality of pages held in the memory;

an instruction translation look aside buffer (ITLB);

an ITLB miss handler associated with the ITLB;

a data translation look aside buffer (DTLB);

a DTLB miss handler associated with the DTLB; and

an executable/non-executable x-indicator associated with each page in memory wherein the DTLB miss handler sets the x-indicator for a particular page to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the ITLB refuses to load instructions from a page if the x-indicator indicates a “non-executable” state,  
wherein the DTLB is utilized only for vector accesses to memory.

16. (Previously presented) A system comprising:

a memory;

a plurality of pages held in the memory;

an instruction translation look aside buffer (ITLB);

an ITLB miss handler associated with the ITLB;

a data translation look aside buffer (DTLB);

a DTLB miss handler associated with the DTLB; and

an executable/non-executable x-indicator associated with each page in memory wherein the DTLB miss handler sets the x-indicator for a particular page to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the ITLB refuses to load instructions from a page if the x-indicator indicates a “non-executable” state, further comprising for each page in memory:

a read bit indicating that the page is valid and readable; and

a write bit indicating that the page is valid and writable.

17. (Original) The system of claim 10, further comprising a page table used to translate a virtual address to a real address, wherein the x-indicator for each page is held in the page table entry associated with that page.

18. (Original) The system of claim 17, wherein the page table used to translate a virtual address to a real address includes a write bit in each page table entry.

19. (Original) ~~The system of claim 17,~~

A system comprising:

a memory;

a plurality of pages held in the memory;

an instruction translation look aside buffer (ITLB);

an ITLB miss handler associated with the ITLB;

a data translation look aside buffer (DTLB);

a DTLB miss handler associated with the DTLB;

an executable/non-executable x-indicator associated with each page in memory wherein the DTLB miss handler sets the x-indicator for a particular page to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the ITLB refuses to load instructions from a page if the x-indicator indicates a “non-executable” state; and

a page table used to translate a virtual address to a real address, wherein the x-indicator for each page is held in the page table entry associated with that page,

wherein the page table used to translate a virtual address to a real address includes:

a write bit in each page table entry; and

a read bit in each page table entry.

20. (Original) The system of claim 10, further comprising a write bit associated with each page in memory that indicates the respective page is writable.

21. (Previously Presented) A computerized method comprising:  
providing a system with a processor having a memory;

holding a plurality of pages in the memory;  
translating an address for an instruction fetch; and  
translating an address for a data access, wherein the translating of the address for the instruction fetch includes determining whether the address has an executable indication associated with the address and only if executable then continuing with the instruction fetch, and is done differently than the translating of the address for the data access, and  
wherein the translating of the address for the data access includes setting a non-executable indication.

22. (Original) The method of claim 21, wherein setting of a non executable indication is done for a page holding the data for a data access.

23.-24. (Cancelled)

25. (Previously Presented) The method of claim 21, wherein the translating of the address for the data access also includes setting the non executable indication to “on” for a page holding the data access address if a write indication is set for that page.

26. (Original) The method of claim 21, wherein the non executable indication is set for a page holding the data access address in response to finding a write indication to allow writing to the page.

27. (Previously Presented) A computer program product for use with a computer system having a processor and memory, the computer program product associated with translating virtual addresses to real addresses, the computer program product comprising a computer-usable medium having a set of instructions executable by a suitably programmed information handling system embodied in the computer usable medium for causing the computer system to execute a method comprising:

holding a plurality of pages in the memory;  
translating an address for an instruction fetch; and

translating an address for a data access, wherein the translating of the address for the instruction fetch includes determining whether the address has an executable indication associated with the address and only if executable then continuing with the instruction fetch, and is done differently than the translating of the address for the data access, and

wherein the translating of the address for the data access includes setting a non executable indication.

28.-29. (Cancelled)

30. (Original) The computer program product of claim 27, further comprising instructions wherein the translating of the address for the data access also includes setting the non executable indication for a page holding the data access address on if a write indication is set for that page.

31. (Original) The computer program product of claim 27, further comprising instructions wherein the non executable indication is set for a page holding the data access address in response to finding a write indication to allow writing to the page.

32. (Original) An apparatus for translating virtual to real addresses in a computing system having a processor and a memory, the apparatus comprising:

means for holding a plurality of pages in the memory;  
means for translating addresses for instructions;  
means for translating addresses for data, wherein means for translating addresses for instructions operates separately from means for translating addresses for data, and  
wherein means for translating the address of a page for a data access further includes means for setting a non executable indication.

33. (Original) The apparatus of claim 32, wherein means for setting the non executable indication is done for a page holding the data for a data access.



34. (Previously Presented) The apparatus of claim 32, wherein means for translating the addresses of the instructions includes means for checking the non executable indication.

35. (Previously Presented) The apparatus of claim 32, wherein means for translating ~~of~~ the addresses of the instructions includes:

- means for checking the non executable indication; and
- means for disallowing an instruction-buffer load based on the non executable setting.

36. (Previously Presented) The apparatus of claim 32, wherein means for translating of the address for the data access also includes means for setting the non executable indication to “on” for a page holding the data for the data access address ~~on~~ if a write indication is set for that page.

37. (Previously Presented) A system comprising:

- a memory;
  - a plurality of pages held in the memory;
  - an instruction buffer;
  - a translation look aside buffer (TLB) having a plurality of TLB entries, each of the plurality of TLB entries having an instruction/data (I/D) indicator and data from a page in memory;
  - a translation look aside (TLB) miss handler; and
  - an executable/non-executable (x) indicator associated with each page in memory,
- wherein the TLB miss handler sets the I/D-indicator to be loaded into a particular TLB entry to indicate “instructions” when the associated page has its associated x-bit indicating “executable” and to indicate “data” when the associated page has its associated x-bit indicating “non-executable,” and wherein the system refuses to allow data from a page indicated as “data” to be loaded into the instruction buffer.

38. (Previously Presented) The apparatus of claim 37, further comprising:

- a cache having a plurality of cache lines, each cache line having an instruction/data (I/D) indicator, wherein, based on a TLB miss, the TLB miss handler loads at least one cache line with

data from a page in memory and with an I/D indication based on the x-indicator associated with that page in memory.

39. (Previously Presented) The system of claim 37, wherein the DTLB includes a first portion used only for vector accesses to memory.

40. (Previously Presented) The system of claim 37, wherein the DTLB includes a second portion used only for scalar accesses to memory.

41. (Previously Presented) A system comprising:  
a memory;  
a plurality of pages held in the memory;  
an instruction translation look aside buffer (ITLB);  
a first data translation look aside buffer (first DTLB);  
a translation look aside (TLB) miss handler; and  
an executable/non-executable (x) indicator associated with each page in memory wherein the x-indicator for a particular page is set to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the TLB handler refuses to load the ITLB from a page with an associated x-indicator of “non-executable”.

42. (Currently amended) ~~The apparatus of claim 41, further comprising:~~

A system comprising:

a memory;  
a plurality of pages held in the memory;  
an instruction translation look aside buffer (ITLB);  
a first data translation look aside buffer (first DTLB);  
a translation look aside (TLB) miss handler; and  
an executable/non-executable (x) indicator associated with each page in memory wherein the x-indicator for a particular page is set to indicate “non-executable” when that page is

accessed in a mode that allows writing to that page, and wherein the TLB handler refuses to load the ITLB from a page with an associated x-indicator of “non-executable”; and

a cache having a plurality of cache lines, each cache line having an instruction/data (I/D) indicator, wherein, based on a TLB miss, the TLB miss handler loads at least one cache line with data from a page in memory and with an I/D indication based on the x-indicator associated with that page in memory.

43. (Currently amended) ~~The system of claim 41,~~

A system comprising:

a memory;

a plurality of pages held in the memory;

an instruction translation look aside buffer (ITLB);

a first data translation look aside buffer (first DTLB);

a translation look aside (TLB) miss handler; and

an executable/non-executable (x) indicator associated with each page in memory wherein the x-indicator for a particular page is set to indicate “non-executable” when that page is accessed in a mode that allows writing to that page, and wherein the TLB handler refuses to load the ITLB from a page with an associated x-indicator of “non-executable”; and  
wherein the first DTLB is used only for vector accesses to memory.

44. (Currently amended) The system of claim [[41]] 42, further comprising a second DTLB, wherein the second DTLB is used only for scalar accesses to memory.